Money Creation

The money created by the Federal Reserve is the *monetary base*, also known as *high-powered money*.

Banks create money by making loans. A bank loans or invests its excess reserves to earn more interest.

A one-dollar increase in the monetary base causes the money supply to increase by *more* than one dollar. The increase in the money supply is the *money multiplier*.

Money Supply

Money is either currency held by the public or bank deposits:

$$M = C + D.$$

Monetary Base

The monetary base is either held by the public as currency or held by the banks as reserves:

$$B = C + R.$$

For example, a one-dollar withdrawal from the bank causes C to rise by one and R to fall by one, so the sum is unchanged.

Simplest Model of the Money Supply

Consider the simplest model of money creation by banks.

All money is bank deposits, and the public holds no currency. Since $C = 0$,

$$M = D$$
$$B = R.$$

Banks hold the fraction f of deposits as reserves,

$$fD = R.$$

Money Supply

Therefore

$$B = R = fD = fM,$$

so

$$M = \frac{B}{f}.$$

Money Multiplier

The monetary base has a multiplier effect on the money supply: the money multiplier is

$$\frac{1}{f}.$$

If the Federal Reserve raises the monetary base by one dollar, then the money supply rises by $1/f$ dollars. For example, if the reserve requirement is $f = .10$, then the money supply rises by ten dollars, and one says that the money multiplier is ten.

Money-Multiplier Process

The money-multiplier process explains how an increase in the monetary base causes the money supply to increase by a multiplied amount. For example, suppose that the Federal Reserve carries out an open-market operation, by creating \$100 to buy \$100 of Treasury securities from a bank. The monetary base rises by \$100.

Step-by-Step Process

The bank has \$100 of excess reserves, so it loans the \$100 to earn interest. The borrower uses the money to buy something.

The seller receives the \$100 and deposits it in his bank. Assume that the reserve requirement is $f = .10$. The bank keeps $.10 \times \$100 = \$10$ as reserves, and loans the remaining \$90 of excess reserves. The borrower uses the money to buy something.

The seller receives the \$90 and deposits it in his bank. The bank keeps $.10 \times \$90$ as reserves, and loans the remaining \$81 of excess reserves. The borrower uses the money to buy something.

The seller receives the \$81 and deposits it in his bank, and the process continues.

Evaluation of the Money Multiplier

The total increase in the money supply is the sum of the increases at each step:

$$\begin{aligned}\Delta M &= 100 + 90 + 81 + \cdots \\ &= 100 + 100 \times .90 + 100 \times .90^2 + \cdots,\end{aligned}$$

an infinite geometric sum.

As the first term is 100 and the ratio of successive terms is $1 - f = .90$, the formula for an infinite geometric sum yields

$$\Delta M = \frac{100}{1-(1-f)} = \frac{100}{f} = 1000.$$

Thus the money multiplier is ten: the money supply rises by ten for every one dollar increase in the monetary base.